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ABSTRACT

The domain of second language reading is a rich source for insights into bilingual cognitive processing. Most cross-language transfer research has been carried out on acquisition and production of second-language (L2) structures. Relatively little work has been done on cross-language transfer in bilingual reading. An overreliance on top-down, psycholinguistic-guessing-game models in the fields of L2 reading is one reason why cross-language transfer in initial word-recognition stages of reading has not been studied vigorously. Researchers have developed several models of the reading process (particularly orthographic and phonological processing) in which cross-language transfer effects may be sought. Another variable that may affect cross-language transfer is the morphemic complexity of the words. One of the most vigorously investigated areas is how bilinguals represent the meaning of words in their two languages. Some of the richest data in L2 acquisition come from studies on syntactic transfer. Cross-language transfer of background knowledge and cultural schemata is of major concern for L2 pedagogy. As reading progresses, self-monitoring of text understanding becomes essential. More research on the effects of first-language (L1) on L2 reading is needed especially in the initial word recognition stages. Isolating the components of the reading process and investigating the nature of cross-language transfer within each component is essential for the understanding of cross-language transfer in L2, particularly, and bilingual cognitive processing, generally. (Eighty-eight references are attached.) (RS)

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CENTER FOR THE STUDY OF READING

ED345208

Technical Report No. 555

THE ROLE OF FIRST LANGUAGE IN THE SECOND-LANGUAGE READING PROCESS

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Abstract

Focusing on the influence of first-language knowledge, strategies, and processes on reading in a second language (i.e., cross-language transfer), this report identifies major subcomponents of the reading process and reviews research that examines the influence of the first language within those subcomponents.

THE ROLE OF FIRST LANGUAGE IN THE SECOND-LANGUAGE READING PROCESS

The domain of second language reading is a rich source for insights into bilingual cognitive processing. Reading entails the utilization of linguistic and metalinguistic knowledge in order to comprehend the meaning of written symbols. When bilinguals are reading in their second language (L2), they usually bring to the act a wealth of knowledge, strategies, and processes from their first language (L1). The question addressed in this report is how and when the L1 influences L2 reading, that is, cross-language transfer. We believe this topic is important for several reasons. At a theoretical level, what transfers across languages can give researchers an indication of the type of structure imposed by bilinguals on their L1 (Kellerman, 1986), because unless the bilinguals have an (implicit) awareness of the linguistic structure in their native language, they cannot impose this structure on the L2 processing.

At the applied level, understanding the nature of cross-language transfer in reading can enable us to predict not only the conditions under which a bilingual will have difficulty when processing L2 (i.e., negative transfer), but also the conditions under which a bilingual will show facilitation (i.e., positive transfer). This information can help to structure instruction so it can build upon the strengths bilinguals already have in their L1. In this report, we review evidence of cross-language transfer in different subcomponents of the reading process. Our intention is to summarize what we already know and indicate areas that need to be investigated more thoroughly.

A Brief History

One of the earliest models on cross-language influence was developed by Lado (1957). In what is known as the Contrastive Analysis (CA) approach, L2 acquisition was considered to be highly influenced by the characteristics of L1. Hence, detailed, descriptive analyses of the structures in both the L1 and the L2 of a bilingual were recommended. Whereas structures similar in the two languages were assumed to facilitate acquisition, structures different in the two languages were assumed to slow acquisition. CA developed at a time when behaviorist views dominated psychology and education. Transfer was usually interpreted as L1 habits interfering with acquisition of the L2 structures. Although Lado was interested in comparing not only grammatical and phonological constructs in the two languages of a bilingual but also distribution of forms and meanings and culture, CA was basically used most frequently for comparing the linguistic features of the two languages (see, e.g., McKay & Wong, 1988; Robinett & Schacter, 1983).

As major theoretical shifts occurred in linguistics and psychology (e.g., Chomsky, 1959), researchers began to focus more on universals of language acquisition rather than on differences among languages. An alternative hypothesis to CA, namely, the L1 = L2 or identity hypothesis was proposed (Dulay & Burt, 1974; Dulay, Burt, & Krashen, 1982). The analysis of the kind of errors produced in the L2 speech of bilinguals seemed to indicate that the errors followed a pattern similar to that of monolingual children acquiring their L1. These data were taken to imply a universal developmental sequence in language acquisition. The identity hypothesis claimed that L2 learners actively organize the new language that they hear and make generalizations about its structures, just like children learning their L1. Within this framework, the role of L1 and cross-language transfer was assumed to be limited or unimportant. For example, Bailey, Madden, & Krashen (1974) observed that the ordering of the accuracies of producing 8 grammatical morphemes (such as present progressive -ing, plural -s) in English speech was similar for L2 learners from different language backgrounds.

As Odlin (1989) summarized, the reaction to CA, and the popularity of the L1 = L2 universalist hypothesis diverted attention away from the issue of cross-language transfer. Logically, however, rejecting CA as a methodology did not necessarily imply that transfer does not occur across languages

of a bilingual. Most of the research on the L1 = L2 hypothesis was on inflectional morphology and syntax. Although these areas could be exhibiting the operation of universal linguistic principles to a large extent, other areas, such as vocabulary development, phonology, and metacognitive strategies, could exhibit the influence of L1 knowledge and strategies on L2 processing. Consequently, researchers once again began to focus on the influence of the L1 and the cross-language transfer issue was resurrected in the 1980's (see Gass & Selinker, 1983; Kellerman & Sharwood Smith, 1986; Odlin, 1989; Ringbom, 1987). The current focus on cross-language transfer, however, is different from the CA tradition. Some researchers have even suggested using terms like *crosslinguistic influence* (Sharwood Smith & Kellerman, 1986) or *the role of mother tongue* (Corder, 1983) in order to overcome the behaviorist connotations of the term *transfer*.

Differing from the CA approach, current studies indicate that formal structural similarity is not enough for transfer to occur (Sharwood Smith & Kellerman, 1986). The second-language learners need to be aware of the parallels between their L1 and L2. This can sometimes lead to drawing parallels even when there are none in the formal structures of the languages. In other words, it is not the formal linguistic typology, but psychotypology (Kellerman, 1986), a learner's *perception* of similarities between the two languages, which is important. Current cross-language transfer research also differs from the research three decades ago because now the role of language universals is acknowledged and integrated into models (see, e.g., Bley-Vroman, 1986; Corder, 1983; Gass, 1986).

Cross-language Transfer in Reading

As this brief historical sketch suggests, most of the cross-language transfer research has been carried out on acquisition and production of L2 structures and relatively little work has been done on cross-language transfer in bilingual reading. Although some of the previous transfer research is very relevant for reading, it does not address all the possible loci of transfer. Even researchers who *do* study cross-language transfer in reading usually focus on transfer of background knowledge or metacognitive strategies, but not on the initial word recognition stages. There are several reasons why cross-language transfer in initial word recognition stages of reading has not been studied as vigorously: First, there is an overreliance on top-down, psycholinguistic-guessing-game models in the fields of L2 reading (Carrell & Eisterhold, 1983). These top-down models assume that visual processing plays a limited role in reading because reading proceeds by forming hypotheses about upcoming words and minimally sampling the visual information on the page. Such a view of reading has not been supported by the L1 reading research in the last decade (for reviews, see Rayner & Pollatsek, 1989; Stanovich, 1980; 1986), and yet most of the L2 reading research is based on that model. Consequently, in L2 reading, background knowledge that should enable a reader to make predictions is investigated much more often than visual processing (Weber, 1991). Cross-language transfer research follows this trend as well.

Another difficulty for studying cross-language transfer in reading is due to the nature of the reading process. Most children acquire language with little or no difficulty, but the acquisition of reading requires more effort and instruction. Although there is some overlap, comprehension of speech is different from comprehension of written texts (for reviews, see Horowitz & Samuels, 1987). When investigating the effects of L1 on L2 acquisition, often the L1 knowledge is assumed to be well-developed and it usually is. Such an assumption is not necessarily true in L2 reading research. L1 reading may be at different levels of proficiency across different bilinguals. Hence, there is a controversy on what transfers in bilingual reading. If there is a weakness in L2 reading, is it a language problem or a reading problem (Alderson, 1984)? Some researchers claim that reading is a universal process (cf. Goodman, 1970) and hence should be similar across languages. Hence, it is expected that reading abilities will transfer across languages. Individuals proficient in their L1 reading will also be proficient in their L2 reading. On the other hand, some researchers claim that reading problems in the L2 are largely due to inadequate knowledge of the L2 because, it is assumed that a reader may not have enough linguistic proficiency to pick up correct cues from the text to make correct guesses and predictions. Finally, there

are other researchers who claim a middle ground. According to this group, the skills and knowledge from the L1 can transfer to L2 reading, but only when the reader has a certain level of linguistic proficiency in the L2 (for an overview, see Alderson, 1984). Although it is couched within an outdated top-down view of reading, this controversy is still useful in pointing out that when considering the influence of the L1 on L2 reading, variables such as L2 linguistic proficiency as well as L1 and L2 reading proficiency are crucial. As Hornberger (1990) noted, for a child in a bilingual education program, L2 literacy is built on minimal reading proficiency in the L1, whereas for a university student learning a foreign language, L2 literacy is built on a highly developed L1 reading proficiency. In sum, what transfers from the L1 to L2 reading may depend on how developed L1 reading proficiency is.

Components of the Reading Process

In this report, we will focus on different components of the reading process in order to identify the loci and nature of cross-language transfer. Some of the components are, in reality, highly interactive and integrated, however, we agree with Carr and his colleagues (see Carr & Levy, 1990) and Rayner & Pollatsek (1989) that although it is important to put all the information together to have an overall model of the reading process, it is likely that "the greatest advances in understanding reading will come through researchers working on each subcomponent process . . . As we understand each of the component processes in reading better, we will be able to put them together to understand 'the big picture'" (Rayner & Pollatsek, 1989, p. 478-79).

Reading can be thought of as a combinations of several subcomponent processes. To give a generic overview, orthographic processing refers to translating written symbols to a visual code and activating the meaning of that visual code. Phonological processing refers to translating visual information to a phonological code and activating its meaning. As individual words are recognized, clusters of them are assumed to be kept in working memory for assigning syntactic functions, and later, with the help of background knowledge, the activated meanings are integrated into the ongoing text representation. During the whole process, metacognitive processes guide attention and warn the reader if any misunderstanding or a conflict with the background knowledge or current text representation occurs. We will now look at each of these components for possible cross-language transfer effects.

Orthographic and Phonological Processing

Orthographic processing requires different sets of knowledge and strategies. One basic subcomponent is the knowledge of individual symbols and their identities. For example, an English speaker learning to read in Arabic or Greek needs to memorize the alphabet, the symbols and their referents. At a more metalinguistic level, beginning readers need to understand what is represented by each orthographic symbol. In alphabetic languages, letters usually represent sounds or phonemes, whereas in languages such as Japanese or Chinese, the symbols may refer to syllables, morphemes or words. Another component of orthographic processing is awareness of common orthographic patterns in alphabetic languages. For example, in English, *u* is the most likely letter to follow an initial *q*, but not an initial *i*. Research with monolinguals shows that although they may not easily verbalize this knowledge, skilled readers are very sensitive to common letter combinations in their written language (Henderson & Chard, 1980). In making word/nonword decisions on letter strings, if the overall test list contains random letter strings (e.g., *ŋgjik*), rather than word-like nonwords (e,g., *guitas*) mixed in with words, readers use different strategies. With random letter strings in a list, the word/nonword decisions can be based on orthographic information rather than on the meaning of the words (Seidenberg, 1985). If, however, the test list contains word-like nonwords, with common orthographic patterns, then a semantic analysis is necessary to distinguish between words and nonwords (James, 1975). Awareness of such redundancies in letter sequences that facilitates word recognition usually develops as a result of experience rather than as a result of knowing the rules.

Favreau, Komoda, and Segalowitz (1980) found that the efficient usage of orthographic redundancies in a language differed in the two languages of a bilingual. They used a word superiority effect paradigm to investigate the influence of orthographic redundancies. Native speakers of English who were also fluent in French, first briefly saw a word (e.g., *work*), an anagram (e.g., *orwk*) or a single letter (e.g., *k*). After the offset of the item, two letters were presented above and below the location where the critical letter occurred and the subjects were asked to choose the letter that actually appeared in the stimulus just presented. The usual finding in this type of experiments is that letters of the words are identified more accurately than the letters of anagrams or even better than single letters. This is called the word superiority effect because the orthographic redundancy found in words seems to facilitate the identification of its component letters.

Favreau and her colleagues found that with English materials and instructions, regular word superiority effect appeared. However, when the task and materials were in French, no word superiority effect was found. All three conditions led to the same level of accuracy. In a second experiment, the mean duration of French materials was longer than that of English materials. With differing mean durations, both French and English materials yielded significant word superiority effects. In sum, the fluent bilingual subjects were able to use the orthographic redundancies in their L2 to facilitate the processing of individual letters when they had sufficient processing time.

Finally, orthographic knowledge also involves mapping of symbols to the speech code. In languages such as Turkish and Serbo-Croatian that have "shallow" orthographies, the correspondence between a letter and its sound is very transparent. For example, in all of the following Turkish words the letter *a* is pronounced "ah," *altin, kalem, boru*. Contrast it with the pronunciation of *a* in the following English words, *ant, gave, car*.

In English, some words have spelling patterns that are always pronounced the same way, just like the orthographic-phonological regularity in "shallow" orthographies. These are usually called regular or consistent words (Jared, McRae, & Seidenberg, 1990; Seidenberg, 1985, 1989). For example, the ending (or more technically, the rime) *-est* is always pronounced the same way in different words such as *best, nest, rest*. Some researchers assume that these regular words are pronounced using regular spelling-to-sound correspondence rules. In other words, the phonological translation of a visually presented word is used to activate its meaning. This is called indirect access to meaning or phonological mediation.

In English there are also inconsistent words. Such words have different pronunciations although the spelling pattern in their word family is the same. For example, the words *mint* and *pint* are classified as inconsistent because although their spelling patterns have the common rime *-int*, they are pronounced differently. (*pint* is also called an exception word because its pronunciation differs from that of the whole family, *mint, hint, tint, lint*). Trying to pronounce exception words *pint* and *have* using spelling-to-sound correspondence rules will lead to errors. Hence, some theorists propose a second route which involves accessing the meaning of a word directly using visual-orthographic information--with no phonological mediation--and later "looking up" its pronunciation from the lexicon (for reviews, see Carr & Pollatsek, 1985; McCusker, Hillinger, & Bias, 1981).

More recently, Seidenberg and McClelland (1989, see also Seidenberg, 1985) have proposed that orthographic and phonological processing are not two independent routes, but rather parallel components of the same interactive processing system. In their connectionist model, spelling and pronunciation of a word are represented by patterns of activation across units encoding orthographic and phonological information. It must be emphasized that these units are the same for all words and nonwords. What changes is the pattern of activation across these units for different items. The weights of the connections between orthographic and phonological units get adjusted with experience and constitute the knowledge of the spelling to sound correspondences. For both regular and exception words, as well as nonwords, the frequency of experiences with the item itself and with its similarly-

spelled neighbors determine the naming performance (Jared, McRae, & Seidenberg, 1990; Seidenberg, 1989; Seidenberg & McClelland, 1989). To summarize, in this model, the processing of a written word activates in parallel, both phonological and meaning information, but phonological activation is slower because it depends on input from orthographic processing. This assumption implies that phonological information should be effective only under difficult conditions with relatively long response latencies, such as when words have unfamiliar spelling patterns or readers are inexperienced in recognizing spelling patterns, in sum, when orthographic processing is inefficient in activating meaning.

Different orthographies. A natural extension of the discussion on the role of phonology in word recognition is what happens in languages with different orthographic systems. Because orthographies differ in the extent to which they encode phonological information, some researchers have suggested that differences among orthographies may influence the way in which they are processed. Writing systems with shallow orthographies, such as Serbo-Croatian, with its very regular spelling to sound correspondences, may encourage phonologically mediated word recognition based on spelling-to-sound conversion rules (Feldman & Turvey, 1983; Katz & Feldman, 1983). In a language like Hebrew, however, with a "deeper" orthography, phonological mediation may not be very feasible (Bentin, Bargai, & Katz, 1984; Frost, Katz, & Bentin, 1987) because, in Hebrew, phonological information is represented much more indirectly in text. For example, adult readers usually see texts written only in consonants, with vowel dots omitted. Hence, a single consonant string may refer to different words when different vowels are added. Frost et al. (1987) compared naming latencies to high and low frequency words and to nonwords in Serbo-Croatian, English and Hebrew. They found that, overall, the difference between the pronunciation latencies of nonwords and high frequency words was only 56 ms in Serbo-Croatian, whereas in English this difference increased to 101 ms and in Hebrew, the difference was 157 ms. That is, the wordness or lexicality of an item made less of a difference in Serbo-Croatian as compared to English or Hebrew, indicating that Serbo-Croatian items tended to be pronounced as letter strings with little effect of their lexical status.

Seidenberg (1985, 1989, 1990) argues that any writing system incorporates both phonological and orthographic processing. The regularities in the orthographic system, such as those between spelling-to-sound correspondences, will be established depending on prior experience with the words and their neighbors regardless of the nature of the writing system. However with a shallow orthography, it might be possible to get these regularities established much earlier and more efficiently. Consequently, in a language such as Serbo-Croatian, it is likely that a phonological mediation to meaning is more efficient than direct orthographic processing to meaning. Moreover, this model predicts that high frequency words should be recognized rapidly on a visual basis regardless of the depth of orthography because of extensive exposure to that item that strengthened its correct pronunciation. Any differences as a function of the writing system should only appear for low frequency items. In sum, he suggests that it is erroneous to conclude that word recognition in different orthographies exhibit different types of processing.

Transfer of orthographic-phonological information. Bilinguals usually have extensive experience with the orthographic patterns in their L1. Based on the connectionist model described above, these patterns might be active even when reading in a second language and hence yield the effects of orthographic redundancies in L1 on L2 processing. This awareness of orthographic constraints has been studied with German-English bilinguals (Altenberg & Cairns, 1983). In an English lexical decision task, monolingual and bilingual subjects saw words that were orthographically legal in both English and German (e.g., *flag*) or in English but not in German (e.g., *twin*). For the monolinguals, the response times to these two types of words were equivalent. In contrast, bilinguals were faster on words that were legal only in English. These results indicate that orthographic constraints in both languages affected performance of bilinguals even though the task was in English.

Nas (1983) also reported the influence of L1 orthography and phonology on the English lexical decisions of Dutch-English bilinguals. In that study, the test list included English high-frequency words, English-like nonwords (e.g., *prusk*) and pseudohomophones. The pseudohomophones were nonwords (e.g., *snay*) that were pronounced like a real Dutch word (e.g., *snee*). The lexical decision latencies to pseudohomophones were significantly longer compared to nonwords that did not sound like Dutch words. Hence, although no Dutch words were included in the test list, it was harder to reject nonwords that sounded like Dutch words.

In contrast, Scarborough, Gerard, and Cortese (1984) did not find effects of the other language of a bilingual in their experiment. In that study with Spanish and English bilinguals, the test lists contained words in the target language (both high and low frequency) and nonwords based on the orthography of the target language. More interestingly, the test lists also contained either words from the nontarget language (both high and low frequency) or nonwords based on the orthography of the nontarget language. For example, if the target language was Spanish, the test list included *mesa* (meaning *table*), *narin* (nonword) and *city* (word in the nontarget language) or *trenty* (nonword based on the nontarget language orthography). In addition, half of these three types of items were repeated. The data indicated that bilinguals were treating the *words* in their second language as if they were nonwords. For example, nontarget-language words showed no effects of frequency, and they showed repetition effects comparable to those of nonwords rather than those of words.

The discrepant results of these studies indicate that cross-language transfer cannot be defined in absolute terms because it depends on the experimental context and materials. Supporting this conjecture is a study by Grainger and Beauvillain (1987). These researchers showed that mixing languages in a test list slowed lexical decisions only on words with similar orthographies in the two languages compared to those in a test list with unmixed languages. Words with distinct spelling patterns in the two languages were not affected by mixing of the languages.

The overlap in spelling patterns is at the maximum for interlexical homographs (e.g., the word *pain* meaning *bread* in French). Beauvillain and Grainger (1987) investigated whether a word like *pain* facilitated the processing of the related words in the two languages, *ache* or *beurre* (meaning butter). Their data indicated that frequency rather than language determined the facilitation of related meaning. *Pain* with its low frequency reading in English but high frequency reading in French, facilitated the processing of *beurre*, but not that of *ache*, although *pain* was read as an English word. When a word like *four* with a low frequency reading (meaning oven) in French but a high-frequency reading in English was presented, it facilitated the processing of *five* even when it was presented as a French word. These results indicate that when a word with a common spelling pattern in two languages is presented, it facilitates processing of its most common associate even across languages.

The effects of L1 orthography on L2 tasks have not been investigated systematically, particularly with beginning readers. It needs to be tested if readers recognize L2 words with familiar L1 patterns more rapidly in *silent* reading even though phonologically they may not be similar. Conversely, if the spelling patterns in a reader's L1 is dissimilar to the spelling patterns in L2 does it cause difficulties (Barnitz, 1985)?

In oral language production and in reading out loud, the effects of L1 on L2 pronunciations was studied extensively in earlier CA studies. An example is Brazilian Portuguese-speakers pronouncing an English word beginning with an *r*. Though the flapped *r* exists in Brazilian Portuguese, syllable-initial *r* is pronounced [x], like the English *h* (with slight friction), leading to pronunciations such as [*xaet*] (like *hat*) for *rat* and [*xol*] (like *hole*) for *roll*. Though beneficial for the data they provide, these earlier studies were descriptive in nature and did not have the predictive power to determine a priori when L2 pronunciations would be affected by the L1. Currently, we are working on a computational model of an L2 phonology (cf. Dell & Juliano, 1991), in which the words in the L2 are filtered through the L1

phonology. How the nature and frequency of phonological units (features, syllable structures) available in L1 constrain the L2 pronunciations are of interest. By comparing the pronunciations predicted by the model with actual L2 phonetic transcriptions, we hope to identify what aspects of the L1 phonology are imposed on the L2, thus marking the L2 pronunciation and perhaps inhibiting comprehension and communication.

Morphological Processing

Another variable that may affect cross-language transfer is the morphemic complexity of the words. In some Indo-European languages, there is a systematic relationship between corresponding morphological suffixes across languages. For example, compare these English and Spanish word pairs: *organization* and *organización*; *rejuvenate* and *rejuvencer*; *rapidly* and *rapidamente*. It is likely that with no or minimum instruction, proficient L1 readers can map these suffixes with their corresponding forms in L2, for example, *tion* and *ción* are parallel and they turn a verb like *organize* into a noun in both languages. In order to investigate if such knowledge in the L1 can transfer to L2, one needs to consider if the reader is sensitive to these morphological structures in the L1 (Tyler & Nagy, 1989), and, if the answer is yes, does the reader apply this knowledge to recognize L2 words? Some observational data indicated that speakers of Indo-European languages, such as Spanish, were indeed more sensitive to English morphology and word stems in their speech (Saville-Troike, 1984).

In a recent pilot study, we compared the performance of adult Korean- and Spanish-speakers on tasks involving morphologically complex English words. These two language backgrounds were of interest because Spanish and English share many cognates and they both have a relatively weak morphological system in terms of word formation. In contrast, Korean and English do not share cognates and Korean has a rich morphological system, with words easily broken down into morphological templates. In one task, these beginning bilinguals from different language backgrounds completed the letters missing from the stem or the suffix of a word (morpheme-completion test). In another task, they circled derivationally complex words that they thought were *possible* English words (wordness judgment test). In both tasks there were four types of words: both the stem and suffix were cognates in Spanish and in English, either the stem or the suffix was a cognate or neither was a cognate.

Overall, both groups had comparable levels of performance on the two tasks, that is, the main effect of L1 background was not significant. However, when the cognate status was taken into consideration, L1 background made a difference. The data in the morpheme-completion test yielded a significant language background by stem cognate status interaction. Spanish-, but not Korean-speakers, completed cognate stems more accurately than noncognate stems. Likewise, Spanish-speakers were more accurate in completing cognate than noncognate suffixes, whereas Korean-speakers were more accurate on noncognate suffixes. On the wordness judgment test, both groups circled as well-formed, words with cognate stems more often than words with noncognate stems. However, the difference between cognate and noncognate circling performance was smaller in the Korean group as compared to the Spanish group. These data provide us with the preliminary evidence that in identifying morphologically complex words, Spanish-speakers do rely on the overlap between English and their L1.

Meaning Activation

One of the most rigorously investigated areas is how bilinguals represent the meaning of words in their two languages (see, e.g., Chen & Leung, 1989; Chen & Ng, 1989; Cristoffanini, Kirsner, & Milech, 1986; Gerard & Scarborough, 1989; Kirsner, Smith, Lockhart, King, & Jain, 1984; Potter, So, Von Eckardt, & Feldman, 1984; Scarborough, Gerard, & Cortese, 1984). This research area has implications for the transfer issue because, depending on the associations between different concepts in the two languages, conceptual information in the L1 may affect the activation of word meanings in the L2. In one comprehensive study, de Groot and Nas (1991) carried out several lexical decision experiments with

bilinguals proficient in both L1 and L2. Their data indicated that such fluent bilinguals seem to have a highly interconnected network of translation equivalents in the two languages (e.g., *girl* in English and *meisje* in Dutch). The interlanguage associations were even stronger with cognates (e.g., *grond* in Dutch and *ground* in English). In terms of transfer, presenting a semantically related word (e.g., *kalf*) or a translation (e.g., *koe*) in one language helped in the semantic processing of the target word (e.g., *cow*) in another language. There are two caveats, however. First, on some tasks that require subjects to use orthographic information more than semantic information, or on tasks that do not require subjects to intermix languages, bilinguals seem to have separate, independent semantic representations (Durgunoğlu & Roediger, 1987; Scarborough et al., 1984). Also, the connections between the two languages of a bilingual may have different properties depending on the age, proficiency in L2 and the nature of L2 education (Chen, 1990; Chen & Leung, 1989).

Recently we (Nagy, García, Durgunoğlu, & Hancin, 1991) have observed how awareness and knowledge of cognates affects reading comprehension. The question was, if fourth-, fifth-, and sixth-grade Spanish-English bilingual students know the Spanish cognates (e.g., *animal, familia, transportar*), will this knowledge help in understanding the same words in the English passages and increase their overall level of comprehension. To answer this question, we first used English and Spanish checklists to determine whether the students knew these cognates in either of the two languages. Then we gave them English passages containing these cognates and asked multiple choice comprehension questions targeting these cognates. Finally we also asked about their explicit awareness of cognates by asking them to circle any cognates that they noticed in the clean copies of reading passages. A multiple regression analysis was carried out with comprehension test performance as the dependent variable and the performance on checklist and circling tests along with their interactions as independent variables. In predicting performance on the comprehension test, even after the reported knowledge of the English word itself was taken into consideration, knowledge of the word in Spanish along with awareness of that word as a cognate were significant predictors of performance. Hence, these data indicate that even for intermediate bilingual readers, there is some cross-language transfer that helps in comprehending cognate English words and the text. However, just knowing the word in Spanish is not enough to understand its cognate in English. What is also needed is an awareness that a word is possibly a cognate.

Syntactic Processing

Some of the richest data in second-language acquisition come from studies on syntactic transfer. In this line of studies, researchers usually take a linguistic parameter and compare the syntactic processing of groups of bilinguals who have similar or different parameter settings in their L1. For example, White (1989) focused on the adjacency condition. In English, there is a strict adjacency requirement. Nothing can intervene between a verb and its direct object, unless under some very narrow conditions. Hence, in English, "Mary ate her dinner quickly" is grammatical, whereas "Mary ate quickly her dinner" is not. French, in contrast, has a more flexible adjacency requirement. In White's study, native speakers as well as L2 learners made grammaticality judgments on sentences in which the position of the direct object relative to the verb was manipulated. French sentences that violated the English adjacency requirement were judged as ungrammatical by more English speakers learning French than by native French speakers, 70% versus 40%, respectively, hence reflecting the relative rigidity of the English adjacency condition. In contrast, English sentences that violated the adjacency condition were judged as grammatical by more French speakers learning English than by native English speakers, 46% versus 10%. In short, the salient grammatical parameter setting in L1 was transferred to L2.

Most of the research on bilingual syntactic processing has been carried out in the field of second language acquisition, focusing on how grammatical knowledge in L1 affects acquiring parallel or divergent constructs in L2 (for reviews, see Madrid & Garcia, 1985; McLaughlin, 1984). The critical question is whether the syntactic structures from the L1 imposed on L2 processing also affect reading

comprehension. Studies by MacWhinney, Bates and their colleagues (MacWhinney & Bates, 1987) have shown that the way in which individuals interpret a noun as the agent of the sentence that they have heard depends on several factors, such as the rigidity of word order in a language, the importance of animacy cues, and morphological markers. Moreover, the system of cues in L1 is sometimes applied to the processing of L2 sentences (Kilborn & Ito, 1989). Because, cross-language transfer can affect how nouns are assigned a syntactic function, we can infer that this will affect the overall comprehension through the kind of text representation that is created.

For monolinguals reading in English (or in Dutch, see Frazier, 1987), several simple principles (e.g., minimal attachment principle) have been proposed to explain how groups of words in working memory are assigned to their syntactic constituents. For example, the minimal attachment principle states that when reading the sentence "the lawyer heard the story," the tendency is to interpret the second noun as the direct object which can lead to errors with sentences such as "The lawyer heard the story was true." Contrastive analyses across readers from different L1 backgrounds are needed to examine how these principles apply to L2 readers. For example, in Turkish, the direct object is always specified by the inflection -i on the noun, rather than by the word order as in English (Slobin & Bever, 1982). For a Turkish speaker, the tendency to interpret the second noun as an object might be much weaker, because in that bilingual's L1, the inflection, rather than word order, specifies the direct object of the verb. Some support for this idea comes from studies by Danks and his colleagues in Polish (in Danks & End, 1987). When reading passages with syntactic violations (e.g., *injury* replacing *injured*) aloud, monolingual English speakers restored most of the violations quite easily. However, when the same experiment was carried out with Polish speakers and in Polish, there were few restorations. Danks and End suggest that because Polish marks syntactic structure primarily with inflectional endings, distortions in the suffixes were much more salient for Polish readers as compared to American readers. Polish readers were more disrupted by any violations in the word endings. Although how L1 syntactic structures are imposed on L2 processing has been extensively studied for production and acquisition of another language, more research needs to focus on cross-language transfer of syntactic processing in L2 reading.

Background Knowledge

As words are parsed by the syntactic processor, they need to be integrated into the continuously-updated representation of the text. For both monolingual and bilingual readers, one of the most important components of reading comprehension is integrating the material that is read into the text representation. Background knowledge and cultural schemas play an important role in this process. The effects of background and world knowledge affecting L2 reading are very well-documented (Carrell & Eisterhold, 1983; James, 1987; Steffensen, 1987).

If the L2 readers have the general cultural framework assumed by the writer, then they can easily comprehend a text and make the necessary inferences. Their performance on recall or comprehension tests are not worse than those of monolinguals (Aron, 1986; Connor, 1984). On the other hand, if they do not have adequate background knowledge, they may distort the text by trying to fit the textual information to their preexisting knowledge structures or have trouble comprehending the text (Steffensen & Joag-Dev, 1984; Steffensen, Joag-Dev, & Anderson, 1979). For example, the influence of L1 culture and knowledge affecting L2 reading comprehension can be seen in the protocols of an Indian subject recalling details of an American wedding ceremony and interpreting the bride wearing a family heirloom as the wedding dress being old (Steffensen et al., 1979). In short, because some of the background knowledge in the L1 does not match the background knowledge necessary to interpret an L2 text, some comprehension problems can occur. Hence, cross-language transfer of background knowledge and cultural schemata is of major concern for L2 pedagogy.

Metacognitive and Metalinguistic Awareness

As reading progresses, self-monitoring of text understanding becomes essential. According to Baker and Brown (1984), skilled readers have a so-called metacognitive awareness of the reading process. Skilled readers have knowledge about their own cognitive resources and what skills are needed to perform the kind of reading task at hand. They also continuously monitor their understanding of the text and take strategic actions, such as rereading, if comprehension is faulty. Recent studies have begun to show the transfer of metacognitive strategies across languages. Hague and Olejnik (1989) reported that awareness of the text structure that can aid comprehension, transfers across languages. Block (1986) noted the similarity of strategies for comprehension of an English text, regardless of the readers' language background.

Currently, another term "metalinguistic awareness" is used to refer more specifically to the developing notions of beginning readers that underlie literacy acquisition (for reviews, see Clay, 1979; Mason & Allen, 1986; Yaden, 1986). One area of metalinguistic awareness research focuses upon young children's notions of purposes and processes of literacy acts, such as why people read or write and conventions of printed language, such as word boundaries, punctuation.

Another type of metalinguistic awareness is understanding the structural properties of spoken and written language. Researchers have shown that bilingual children, by necessity, learn that words are arbitrary labels for concepts. A writing instrument can be called *pencil* in one language and *kalem* in another. Consequently, bilingual children seem to develop the concept of word earlier and can distinguish between a word's form and meaning (Ben-Zeev, 1977; Bialystok, 1987, 1991; Ianco-Worrall, 1972).

In beginning monolingual readers, one of the best predictors of reading acquisition is another type of metalinguistic awareness. This so-called "phonemic awareness" refers to a beginning reader being aware that words in the spoken language consist of smaller parts, phonemes. For example, the word *top* consists of the phonemes, *t, o, p*. If beginning readers have the sensitivity to the small components of a word in their spoken language, they seem to have less difficulty in mapping the letters to sound when learning to read an alphabetic language, in short, understanding the alphabetic principle. The role of phonemic awareness in reading acquisition is a widely researched topic with monolingual children (Goswami & Bryant, 1990; Tunmer & Nesdale, 1985; Wagner & Torgeson, 1987; Yopp, 1988).

In a recent study we looked at cross-language transfer of L1 phonological awareness and its effects on L2 word recognition (Durgunoğlu, Nagy, & Hancin, 1991). First, we determined the *Spanish* phonological awareness levels of Spanish-English bilingual children in kindergarten and first grade. We used a battery of phonological awareness tests that included segmenting, blending and matching tasks. The children segmented words into component phonemes, syllables or onset-rimes. For example when the experimenter said the word *nos*, children segmented it into phonemes, *n-o-s*. Conversely, the children blended the sounds given by the experimenter to identify a Spanish word. In the matching test, out of three words, they identified the one that matched the initial sound(s) of a target word, for example, if the target word was *coche*, they selected the matching word from the set *carta dedo misa*. We also determined both Spanish and English oral proficiency of the children. Next, we observed how the level of phonological awareness in Spanish predicted performance on learning to read unfamiliar English-like pseudowords and reading English words. The English word and pseudoword recognition were the dependent variables in the multiple regression equation. The data indicated that 81% of the variance in English word recognition and 72% of the variance in pseudoword identification could be explained by only two variables: Spanish phonological awareness and Spanish word recognition levels. More interestingly, English oral proficiency was not a significant predictor on English word recognition tests. These data strongly suggest that phonological awareness in L1 can transfer and predict L2 word recognition of beginning bilingual readers.

Conclusions

As this overview of cross-language transfer research indicates, most of the current research in crosslinguistic influence is carried out in the area of second-language acquisition, especially in acquisition of syntactic constructs. More research on the effects of L1 on L2 reading is needed especially in the initial word recognition stages. To systematically study cross-language transfer in L2 reading, we proposed an approach based on a component skills analysis (cf. Carr & Levy, 1990). Isolating the components of the reading process and investigating the nature of cross-language transfer within each component is essential for us to truly understand cross-language transfer in L2, particularly, and bilingual cognitive processing, generally.

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